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(12) **United States Patent**
McGuire

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(54) METHOD OF SEAMING AND EXPANDING AMORPHOUS PATTERNS

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(51) Int. Cl.^{7} G06T 11/20; G06T 17/20
(52) U.S. Cl. 345/441; 345/423
(58) Field of Search 345/441, 423, 345/430, 620, 624

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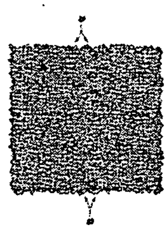
(57) ABSTRACT

The present invention provides a method for creating amorphous patterns based on a constrained Voronoi tesselation of 2-space that can be tiled. There are three basic steps required to generate a constrained Voronoi tesselation of 2-space: 1) nucleation point placement; 2) Delaunay triangulation of the nucleation points; and 3) polygon extraction from the Delaunay triangulated space. The tiling feature is accomplished by modifying only the nucleation point portion of the algorithm. The method of the present invention, for creating an amorphous two-dimensional pattern of interlocking two-dimensional geometrical shapes having at least two opposing edges which can be tiled together, comprises the steps of: (a) specifying the width x_{max} of the pattern measured in direction x between the opposing edges; (b) adding a computational border region of width B to the pattern along one of the edges located at the x distance x_{max}; (c) computationally generating (x,y) coordinates of a nucleation point having x coordinates between 0 and x_{max}; (d) selecting nucleation points having x coordinates between 0 and B and copying them into the computational border region by adding x_{max} to their x coordinate value; (e) comparing both the computationally generated nucleation point and the corresponding copied nucleation point in the computational border against all previously generated nucleation points; and (f) repeating steps (c) through (e) until the desired number of nucleation points has been generated. To complete the pattern formation process, the additional steps of: (g) performing a Delaunay triangulation on the nucleation points; and (h) performing a Voronoi tessellation on the nucleation points to form two-dimensional geometrical shapes are included. Patterns having two pairs of opposing edges which may be tiled together may be generated by providing computational borders in two mutually orthogonal coordinate directions.

10 Claims, 6 Drawing Sheets



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TITLE: Method of seaming and expanding amorphous patterns

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Detailed Description Text - DETX (20):
After the coordinate system and maximum dimensions are specified, the next step is to determine the number of "nucleation points" which will become polygons desired within the defined boundaries of the pattern. This number is an integer between 0 and infinity, and should be selected with regard to the average size and spacing of the polygons desired in the finished pattern. Larger numbers correspond to smaller polygons, and vice-versa. A useful approach to determining the appropriate number of nucleation points or polygons is to compute the number of polygons of an artificial, hypothetical, uniform size and shape that would be required to fill the desired forming structure. If this artificial pattern is an array of regular hexagons 30 (see FIG. 5), with D being the edge-to-edge dimension and M being the spacing between the hexagons, then the number density of hexagons, N, is: ##EQU1##

Current US Cross Reference Classification - CCXR (1):
345/423